Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A fuel cartridge that supplies a source of fuel to a direct methanol fuel cell, the fuel cartridge comprising:

a housing;

a fuel egress port connected to the housing to allow contents in the housing to escape from the housing through the fuel egress port; and

a surface area enhanced planar vaporization membrane disposed in contact with the housing of the fuel cartridge.

2. (Original) The fuel cartridge of claim 1 wherein the surface area enhanced planar vaporization membrane is a polymer membrane disposed about a substantial portion of an interior of the housing to provide a high surface area membrane.

3. (Previously Presented) The fuel cartridge of claim 1 wherein the surface area enhanced planar vaporization membrane is a composite membrane comprised of multiple layers of polymer membrane to increase vapor permeation surface area.

4. (Original) The fuel cartridge of claim 1 wherein the surface area enhanced planar vaporization membrane is a membrane arranged as a series of folds.

5. (Original) The fuel cartridge of claim 1 wherein the surface area enhanced planar vaporization membrane is a polymer membrane provided with macroscopically irregular

and/or microscopically roughened membrane surfaces to increase the effective membrane surface area for vaporization.

6. (Original) The fuel cartridge of claim 1 wherein the surface area enhanced planar vaporization membrane spaces a liquid source of oxidizable fuel from a vapor phase of the source of oxidizable fuel.

7. (Original) The fuel cartridge of claim 1 wherein the cartridge contains a liquid source of oxidizable fuel and/or a carbonaceous compound or mixture of such compounds.

8. (Original) The fuel cartridge of claim 1 wherein the liquid source of oxidizable fuel is methanol.

9. (Original) The fuel cartridge of claim 1 wherein the enhanced planar vaporization membrane is comprised of a polymer material selected from the group consisting of polyurethanes, silicones, poly(trimethylsilyl-propyne), polymeric compositions, and composites.

10. (Original) The fuel cartridge of claim 1 wherein the surface area enhanced planar vaporization membrane enhances a delivery rate of methanol in a vapor phase to the egress port for a given cartridge size.

11. (Previously Presented) A fuel cartridge that supplies a source of fuel to a direct methanol fuel cell, the fuel cartridge comprising:

a housing;

a fuel egress port supported by the housing; and

a composite membrane residing in the housing of the fuel cartridge comprising:

a porous substrate;

a polymer membrane disposed over a first surface of the porous substrate; and

a coating of a methanol-impermeable material disposed over an opposite surface of the substrate.

12. (Original) The fuel cartridge of claim 11 wherein substrate is provided to hold methanol in a liquid state within the porous material to enable liquid methanol to migrate to the polymer membrane and convert to a vapor phase.

13. (Original) The fuel cartridge of claim 11 wherein the composite membrane is wound into a cylindrical shaped element.

14. (Original) The fuel cartridge of claim 11 wherein gaps between the polymer membrane and the methanol-impermeable coating providing a path for transporting a high flux of methanol vapor to the egress port.

15. (Original) The fuel cartridge of claim 11 wherein a plurality of the composite membranes are disposed in the fuel cartridge.

16. (Original) The fuel cartridge of claim 11 wherein a plurality of the composite membranes are disposed in the fuel cartridge and wound into a cylindrical shaped element.

17. (Original) The fuel cartridge of claim 11 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers.

18. (Original) The fuel cartridge of claim 11 wherein the polymer membrane is a polyurethane material.

19. (Previously Presented) The fuel cartridge of claim 11 wherein the polymer material is selected from the group consisting of polyurethanes, silicones, poly(trimethylsilyl-propyne), polymeric compositions, and composites.

20. (Original) The fuel cartridge of claim 18 wherein the polymer has a microporosity characteristic to govern vaporization.

21. (Original) The fuel cartridge of claim 11 wherein the membrane is a sintered metal disc coated with a polymer.

22. (Previously Presented) The fuel cartridge of claim 11 wherein the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface fluorinated high density polyethylene, or other methanol-impermeable material.

23. (Previously Presented) The fuel cartridge of claim 11 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers; the polymer membrane is a polyurethane, a silicone, poly(trimethylsilyl-propyne), or composites of polyurethanes, silicones, poly(trimethylsilyl-propyne) and the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface treated material such as surface fluorinated high density polyethylene, or other methanol-impermeable material.

24. (Previously Presented) A composite membrane comprising:

a porous substrate;

a polymer membrane disposed over a first surface of the porous substrate; and

a coating of a methanol-impermeable material disposed over an opposite surface of the substrate.

25. (Original) The membrane of claim 24 wherein substrate is provided to hold methanol in a liquid state within the porous material to enable liquid methanol to migrate to the polymer membrane and convert to a vapor phase.

26. (Original) The membrane of claim 24 wherein the composite membrane is wound into a cylindrical shaped element.

27. (Original) The membrane of claim 24 wherein gaps between the polymer membrane and the methanol-impermeable coating providing a path for transporting a high flux of methanol vapor.

28. (Original) The membrane of claim 24 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers.

29. (Original) The membrane of claim 24 wherein the polymer material is selected from the group consisting of polyurethanes, silicones, poly(trimethylsilyl-propyne), polymeric compositions, and composites.

30. (Previously Presented) The membrane of claim 24 wherein the polymer has a microporosity characteristic to govern vaporization.

31. (Original) The membrane of claim 24 wherein the membrane is a sintered metal disc, coated with a polymer.

32. (Original) The membrane of claim 24 wherein the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface fluorinated high density polyethylene, or other methanol-impermeable material.

33. (Original) The membrane of claim 24 wherein the substrate is polyethylene, polypropylene, nylon, polyurethane, or other analogous polymers or composites of one or more of these polymers; the polymer membrane is polyurethanes, silicones, poly(trimethylsilyl-propyne), or composites of polyurethanes, silicones, poly(trimethylsilyl-propyne) and the methanol-impermeable coating is a cross-linked rubber, a polymer/inorganic composite, a surface treated fluorinated high density polyethylene.

34. (Withdrawn) An arrangement comprises:

a direct methanol fuel cell;

a fuel cartridge that supplies a source of fuel to the direct methanol fuel cell, the fuel cartridge comprising:

a housing;

a fuel egress port supported by the housing; and

a surface area enhanced planar vaporization membrane residing in the fuel cartridge and

a fuel reservoir that receives fuel from the fuel cartridge, the fuel reservoir arranged to deliver fuel to the fuel cell and the fuel reservoir comprising:

a housing; and

a surface area enhanced planar vaporization membrane residing in the fuel reservoir, which in combination with the surface area enhanced planar vaporization membrane residing in the fuel cartridge provides a dual stage vaporization of fuel to the fuel cell.

35. (Withdrawn) The arrangement of claim 34 wherein at least one of the surface area enhanced planar vaporization membranes is a polymer membrane disposed about a substantial portion of an interior perimeter of the housing to provide a high surface area membrane.

36. (Withdrawn) The arrangement of claim 34 wherein at least one of the surface area enhanced planar vaporization membranes is a composite membrane comprised of multiple layers or folds of polymer membrane to increase vapor permeation surface area.

37. (Withdrawn) The arrangement of claim 34 wherein at least one of the surface area enhanced planar vaporization membranes is a membrane arranged as a series of folds.

38. (Withdrawn) The arrangement of claim 34 wherein at least one of the surface area enhanced planar vaporization membranes is a polymer membrane provided with macroscopically irregular and/or microscopically roughened membrane surfaces to increase the effective membrane surface area for vaporization.

39. (Withdrawn) A method of operating an electronic device comprises:

arranging a fuel cartridge to supply a source of fuel to a direct methanol fuel cell, the fuel cartridge comprising:

a housing;

a fuel egress port supported by the housing; and

a composite membrane residing in the fuel cartridge comprising:

a porous substrate;

a polymer membrane disposed over a first surface of the porous substrate; and

a coating of a methanol-impermeable material disposed over an opposite surface of the substrate.